

Knowledge and perception of flexible partial dentures among private dental practitioners in Kuantan, Malaysia

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Abstract

Nylon-based thermoplastic dentures offer enhanced flexibility compared to conventional dentures, thus improving patient comfort and acceptance. Despite growing patient demand for flexible dentures, their prescription amongst early-career dental practitioners is poor. This study assessed the levels of knowledge and perception of flexible partial dentures among private dental practitioners in Kuantan, Pahang, Malaysia, with specific attention to potential differences between practitioners with <10 and more or equals to 10 years of clinical practice. A cross-sectional study was conducted using validated, self-administered questionnaires distributed to 73 dental practitioners in Kuantan, yielding 63 responses (38 female, 25 male). Respondents were stratified into two cohorts: Group A (n=28, <10 years' experience), and Group B (n=35, more or equals to 10 years' experience). High knowledge levels and positive perceptions were observed across both groups, with total mean scores of approximately 9 observed in each cohort. Statistical analysis showed no significant inter-group differences in mean scores for knowledge and perception ($p > 0.05$). Furthermore, no significant differences were observed between groups regarding mean knowledge scores or perception agreement frequencies. These findings suggest that private dental practitioners in Kuantan demonstrated substantial understanding and favorable attitudes towards flexible partial dentures, independent of years of clinical experience.

Keywords: *flexible partial denture, Kuantan, private dental practitioners*

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Introduction

Flexible dentures represent a class of metal-free removable partial dentures constructed from ISO 1567-compliant thermoplastic resins, such as polycarbonate acrylic resins and polyamide (nylon) polyaryletherketones (Lim *et al.*, 2021). The clinical application of flexible dentures emerged concurrent with the development

of nylon-based thermoplastic resin dentures in 1950 (Rozano *et al.*, 2017). These metal-free removable partial dentures exhibit a significantly reduced flexural modulus compared to conventional polymethyl methacrylate (PMMA) dentures, conferring exceptional breakage resistance to them. Their inherent flexibility facilitates their placement within denture flanges in the buccal vestibule's undercut region (Kapur, 1967). Flexible dentures demonstrate

superior characteristics in terms of comfort, aesthetics and adaptability to the patient's movements in the oral cavity (Singh *et al.*, 2011). Additionally, they provide a viable alternative for patients exhibiting allergic responses to methyl methacrylate monomer or metal components. Contemporary dental practitioners have access to multiple commercial thermoplastic resin options, including Valplast, Flexite, and Acetal, each presenting distinct mechanical and clinical properties (Lim *et al.*, 2021).

The prescription of partial dentures represents a collaborative decision-making process between practitioner and patient. There is a documented preference for flexible dentures, due to enhanced comfort characteristics (Singh *et al.*, 2011). In a study in Rome, 1 out of 5 dentists reported using flexible partial dentures in their clinical practice, citing improved patient comfort and superior aesthetic outcomes (Dragomir, Farcasiu, Pascal, 2021). Higher patient satisfaction rates were observed in flexible dentures when compared against acrylic partial dentures across multiple parameters: aesthetics (53.3% vs. 13.3%), speech function (43.4% vs 20.0%), and comfort (63.6% vs 1.7%) (Akinyamaoju *et al.*, 2019). Furthermore, 1 out of 10 expressed a preference for flexible prosthetics over traditional metallic removable partial dentures (RPDs), primarily due to enhanced comfort, superior aesthetics, and favorable cost to the patient (Akinyamaoju *et al.*, 2019).

To meet the increasing demand for partial dentures, comprehensive practitioner knowledge regarding flexible prosthetics to optimize treatment outcomes. A previous study reported significant disparities in knowledge levels and perceptions of flexible partial dentures between experienced and novice private dental practitioners in Klang, Malaysia (Rozano *et al.*, 2017). According to the authors, this may be attributed to insufficient coverage of partial denture applications in Malaysian dental curricula (Rozano *et al.*, 2017). A previous study by Selvaraj *et al.* in 2023 in Chennai, India revealed significantly higher flexible denture prescription rates among non-

prosthodontist dental practitioners compared to general dentists. Notable knowledge gaps have been identified in undergraduate education, with one study revealing that despite 83% of surveyed dentists reporting awareness of flexible dentures, 77% had never prescribed these dentures to patients (Shivanni *et al.*, 2021).

A study on flexible denture knowledge and perception among private dental practitioners has been reported in Klang Valley, Malaysia (Rozano *et al.*, 2017); however, no comparable study has been performed in Peninsular Malaysia's east coast principal urban center of Kuantan. Situated in the state of Pahang, Kuantan represents a significant healthcare hub, with the Ministry of health data indicating that as of 30 June 2023, the city housed 57.3% (59/103) of Pahang's private dental practices. This concentration of dental healthcare providers presents an opportunity to evaluate the knowledge and perception regarding flexible dentures in a previously unstudied geographical context within Malaysia's healthcare landscape.

The present study aimed to assess knowledge levels and perceptions of flexible dentures among private dental practitioners in Kuantan, Pahang Malaysia, and to investigate potential correlations between duration of clinical experience and practitioner's understanding and attitudes towards flexible partial dentures.

Materials and Methods

This cross-sectional study was conducted under approval by the IIUM Research Ethics Committee (IREC 2022-024). Data collection was performed using previously validated self-administered questionnaires between January 2022 to December 2022 (Rozano *et al.*, 2017). The study population comprised private dental practitioners actively practicing in Kuantan, Malaysia representing diverse demographic characteristics, including ethnicity, gender and duration of clinical experience. The questionnaires were distributed via two modalities: digital dissemination via WhatsApp mobile

application and physical distribution of a printed questionnaires QR codes.

Inclusion and exclusion criteria

The subjects were selected based on purposive sampling methodology. Inclusion criteria was private dental practitioners in Kuantan, Pahang, Malaysia, while exclusion criteria were non- consenting practitioners, employees of the Ministry of Health (MOH), and practitioners operating outside the Kuantan district.

Sample selection

Study participants were grouped into two cohorts based on years of clinical experience: Group A (0-10 years of practice) and Group B (>10 years of practice). Sample size was determined using G*Power software for independent t-test analysis,

with parameters set at $\alpha= 0.05$, power= 0.90, and effect size= 0.8. These parameters yielded a minimum required sample size of 34 participants per group, establishing a total required sample size of 68 participants. Participants were given a set of self-administered questionnaires consisting of 3 sections: demographic details, knowledge on flexible partial dentures, and perceptions of flexible partial dentures. Demographic data collected included age, gender, and duration of clinical practice. The knowledge assessment section consisted of 15 items evaluating participants' understanding of flexible denture characteristics, traits, indications, strengths and weaknesses (Table 1). Knowledge scores were calculated based on correct response frequency. Scores exceeding 50% correct responses indicated higher knowledge levels, and higher mean scores corresponded to greater demonstrated knowledge of flexible partial dentures.

Table 1. Questionnaire on knowledge of flexible denture.

Item	Knowledge on flexible denture		
Q1	Flexible denture is known to be flexible and almost unbreakable	True	False
Q2	Flexible denture is known to be flexible and almost unbreakable	True	False
Q3	Flexible denture material is only made up from Nylon	True	False
Q4	Minimum/no mouth preparation is needed to fabricate flexible denture	True	False
Q5	In ectodermal dysplasia patient, flexible denture may be an option in treatment plan	True	False
Q6	Staining by various ingredient of food, tea and coffee is unlikely to happen	True	False
Q7	Flexible denture can be an alternative for patient that allergic to acrylic denture	True	False
Q8	Flexible denture displaced more soft tissue due to its flexibility	True	False
Q9	Flexible denture is generally used as temporary prosthesis only	True	False
Q10	If patient having limited mouth opening, flexible denture is indicated	True	False
Q11	Undercuts associated with teeth did not pose any problem in insertion or removal of prosthesis	True	False
Q12	Patient with history of repeated denture fractures is indicated to use this prosthesis	True	False
Q13	Patient with lingual tori can use flexible denture without undergoing surgery	True	False
Q14	Flexible partial denture use undercuts in the ridge for retention	True	False
Q15	Technique for insertion and adjustment is same as acrylic partial denture	True	False

Table 2. Questionnaire on perception of flexible denture.

Item	Perceptions on flexible denture	Strongly disagree	Disagree	Agree	Strongly agree
P1	Do you think flexible denture improves digestion?	1	2	3	4
P2	Do you think flexible denture provides more stability during mastication	1	2	3	4
P3	Do you think flexible denture is lighter compared with conventional denture	1	2	3	4
P4	Do you think flexible denture is more reliable for elderly people	1	2	3	4
P5	Do you think flexible denture is easier to wear and remove from mouth compared to conventional denture	1	2	3	4
P6	Do you think your patient will be more comfortable to use flexible denture	1	2	3	4
P7	Do you think flexible denture causes less oral irritation and pain	1	2	3	4
P8	Do you think flexible denture is easier to clean	1	2	3	4
P9	Do you think the cost of constructing a flexible denture is more expensive than conventional denture	1	2	3	4
P10	Do you think flexible denture is easy to construct compared with conventional denture	1	2	3	4
P11	Do you think flexible denture is easy to repair	1	2	3	4
P12	Do you think flexible denture provides more cosmetic solution	1	2	3	4
P13	Do you think flexible denture causes less stress to the remaining teeth and gum	1	2	3	4
P14	Do you think flexible denture will improves general health	1	2	3	4
P15	Do you think flexible denture will improves quality of life	1	2	3	4
P16	Do you think flexible denture is suitable for everyone	1	2	3	4
P17	Do you think flexible denture can be used as permanent prosthesis	1	2	3	4

The perception assessment section consisted of 17 questions evaluated the practitioners’ perception, thoughts and beliefs towards the benefits associated with flexible partial dentures in patients (Table 2). Answers were rated on a 4-point Likert scale (strongly disagree, disagree, agree, strongly agree) as previously established (Rozano *et al.*, 2017). Mean scores for perception were analyzed, with mean values exceeding 50% interpreted as favorable attitudes toward flexible partial dentures, while scores below 50% indicated unfavorable perceptions.

Data was recorded, processed, and analyzed using IBM SPSS Version 25 software. Descriptive statistics were generated, and between-group comparisons of knowledge and perception scores were conducted using independent t-tests to compare for significant differences between dental

practitioners with 0-10 years’ experience (Group A) and >10 years’ experience (Group B). Statistical significance was established at $p < 0.05$.

Results

The socio-demographic profile of participating dental practitioners in Kuantan, Pahang (n=63) is presented in Table 3. From 73 distributed questionnaires, 63 responses were received, yielding Gender distribution analysis showed female respondents (60.3%, n=38) outnumbered male respondents (39.7%, n=25). Regarding clinical experience, 44.4% (n=28) of respondents reported <10 years of experience, while 55.6% (n=35) reported more than 10 years of clinical experience.

Table 3. Sociodemographic profile of private dental practitioners in Kuantan, Pahang (n=63).

Sociodemographic profile		n (%)
Gender	Male	25 (39.7)
	Female	38 (60.3)
Years of practicing dentistry	0-10 years (Group A)	28 (44.4)
	More than 10 years (Group B)	35 (55.6)

Knowledge on flexible partial denture

Correct response rate of 63% was found across the 15 knowledge questions in analysis of knowledge assessment. Figure 1 shows the response frequency distribution by item. Eleven items demonstrated higher correct than incorrect response rates. Q1 (“Flexible denture is known to be flexible and almost unbreakable”) was answered most correctly (88.9%), while Q13 (“Patient with lingual tori can use flexible denture without undergoing surgery”) had the lowest accuracy rates (23.8%). Inter-group comparison of correct response rates is

illustrated in Figure 2. Statistical analysis revealed no significant differences in knowledge levels between groups ($p > 0.05$) (Table 4).

Analysis of aggregate scores demonstrated high knowledge levels among respondents, with the majority scoring more than 50%. Inter-group comparison of correct responses is shown in Figure 2. Statistical analysis revealed no significant differences in knowledge levels between groups differing in duration of clinical experience ($p > 0.05$) (Table 4).



Figure 1. Frequency of the correct answer for knowledge section questions (Q1-Q15).

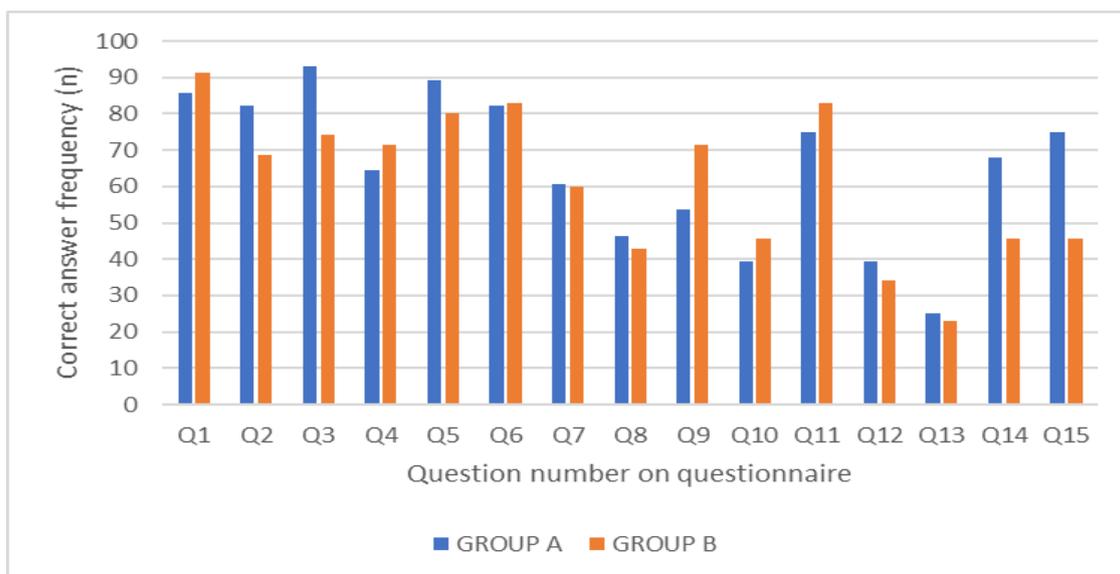


Figure 2. Frequency of correct answers for knowledge section questions. Q1-Q15 indicates item. Group A= ≥10 years' experience, Group B= <10 years' experience

Perception of flexible denture

Frequency of perception response is shown in Figure 3. Overall perception scores demonstrated favorable attitudes toward flexible dentures, with mean scores of 53.5%. Highest agreement frequency was observed for item P3 (“Do you think flexible denture is lighter compared with conventional denture”), with 88.9% of respondents (n=56) indicating agreement. Conversely, only 15.9% (n=10) agreed with

item P11 (“Do you think flexible denture is easy to repair”).

Comparison of perception response frequencies in groups A and B is shown in Figure 4. In Group A, 92.9% (n=26) of respondents agreed with item P9 (“Do you think the cost of constructing a flexible denture is more expensive than conventional denture”), while 10 out of 28

respondents (10.7%) agreed with item P11 (“Do you think flexible denture is easy to repair”). In Group B, 31 over 35 respondents (88.6%) agreed with item P3 (“Do you think flexible denture is lighter compared with conventional denture”), whereas only 5 over 35 respondents (14.3%) agreed with item P16 (“Do you think flexible denture is suitable for everyone”).

Table 4 shows the mean response frequencies for the perception question responses by group. Statistical analysis revealed no significant inter-group differences in perception levels ($p>0.05$), with mean scores of 42.75 and 42.89 for Groups A and B, respectively.

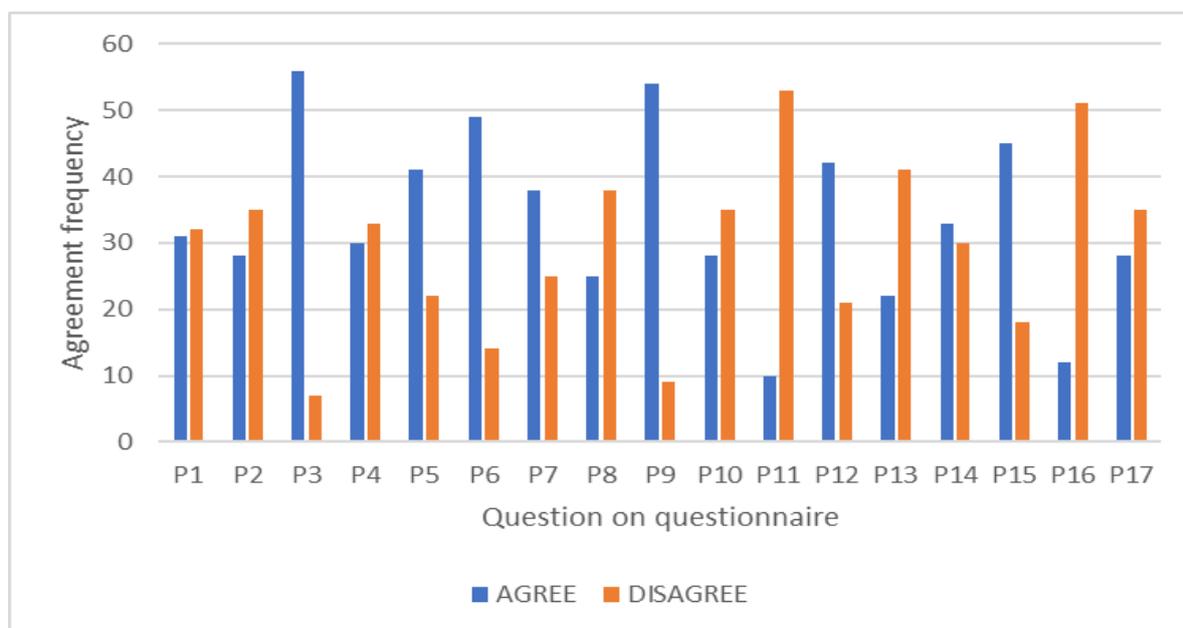


Figure 3. Agreement frequency for each item in the perception section of the questionnaire. P1-P17 indicates item.

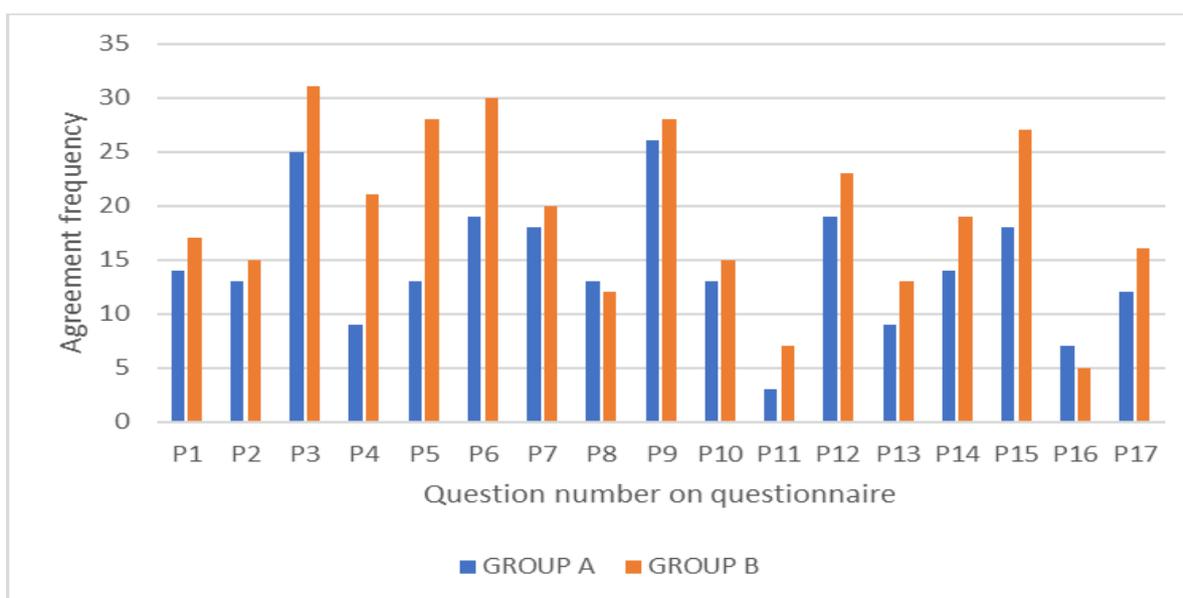


Figure 4. Comparison of agreement frequency for perception questions (P1-P17), by years of practicing (Group A=<10 years’ practice; Group B=>10 years’ practice).

Table 4. Mean scores for knowledge and perception between Group A and Group B.

Variable	Mean scores		Mean difference (95% confidence interval)	t statistic (df)
	Group A (0-10 years)	Group B (>10 years)		
Knowledge	9.79	9.20	0.585 (-0.291,1.462)	1.336 (61)
Perception	42.75	42.89	-0.136 (-4.170, 3.899)	-0.067 (61)

Discussion

Knowledge of flexible denture

Analysis of the knowledge assessment data revealed high knowledge levels among private dental practitioners in Kuantan, as evidenced by predominantly correct responses patterns across the questionnaire. Statistical analysis revealed no significant differences in mean knowledge scores in practitioners with 0-10 and >10 years of clinical experience.

However, significant variation between Groups A and B was observed for item Q9 (“If patient has limited mouth opening, flexible denture is indicated”, correct response: True), suggesting that experience duration may affect understanding of this specific clinical indication. Nevertheless, overall findings indicate that the number of years of experience does not significantly influence comprehensive knowledge of flexible partial dentures. These results align with a previous study by Rozano *et al.* (2017) in the Klang Valley region of Kuala Lumpur, where equivalent knowledge levels among private dental practitioners were observed regardless of gender or years of clinical experience.

A comparative analysis by Daood *et al.* (2022) on removable partial denture curricula across 13 dental schools in Malaysia indicated sufficient educational standards comparable international teaching benchmarks. This standardized educational foundation may account for the observed equivalence in flexible denture

knowledge between early-career and experienced practitioners in both the Klang Valley and in Kuantan, Pahang.

Perception of flexible denture

Analysis of perception data revealed generally favorable attitudes towards flexible dentures, with higher agreement scores across most perception items (53.5% agreement, 46.5% disagreement).

Comparison of perception scores in private dental practitioners with less than 10 years’ experience (Group A) and more than 10 years’ experience (Group B) revealed no significant differences, with three notable exceptions. Significant differences in agreement levels were observed for items addressing elderly patient suitability (P4: “Do you think flexible denture is more reliable for elderly people?”), ease of use (P5: “Do you think flexible dentures are easier to wear and remove from?”), and patient comfort (P6: “Do you think your patient will be more comfortable using flexible dentures?”), with more experienced dental practitioners showing significantly higher agreement rates for these specific aspects. Nevertheless, the overall mean scores for agreement in perception indicate that duration of clinical experience did not influence the perception of flexible partial dentures.

The slightly higher inclination in practitioners with more clinical experience to prescribe flexible dentures is in agreement with a previous study by Rozano *et al.* (2017) indicating a preference for

prescribing flexible partial dentures in practitioners with more than 10 years' experience.

Limitations and further research

This study faced several limitations that warrant consideration in interpreting these findings. First, the minimum sample size was not achieved due to the limited number of private dental practitioners available in Kuantan. Additionally, the study was limited to the town of Kuantan in Pahang, excluding practitioners from other districts and states, which limits the generalizability of findings to broader Malaysian contexts. Furthermore, there was a slight imbalance in the number of dental practitioners across groups, which could have influenced outcomes. Future studies could benefit from expanding the sample size to include practitioners from a broader geographic area, thereby improving sample size and demographic representation.

Conclusion

Private dental practitioners in Kuantan, Pahang exhibited high levels of knowledge and favorable perception of flexible dentures, with no significant association between duration of clinical experience and either knowledge or perception.

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